

RESULTS OF BOREAL OWL (*Aegolius funereus*)
SURVEYS ON THE
JEFFERSON DIVISION OF THE
LEWIS & CLARK NATIONAL FOREST

by

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Cover drawing by John Carlson

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SUMMARY

A survey for boreal owls was conducted on the Lewis and Clark National Forest in the Little Belt Mountains of central Montana during February and March of 1991. The call playback method was used to survey for owls on 19 nights. A total of 13 survey routes were established, encompassing 87 calling points and 70.2 miles. Some routes were surveyed more than once for a total of 88.5 miles. All owl observations were recorded and mapped. Habitat classifications were obtained from timber typing maps for all boreal owl locations. Boreal owls were heard at 8 calling points, represented 6 individuals. All but one were located in lodgepole pine (Pinus contorta) timber types. The other was in a whitebark pine (Pinus albicaulis) timber type. All were located between 6400 ft. and 8088 ft. in elevation. Other owl species located, in order of abundance, were northern saw-whet (Aegolius acadicus), great horned (Bubo virginianus), barred (Strix varia), great gray (Strix nebulosa), and a western screech owl (Otus kennicottii). Surveys are recommended for at least 3 more years in the Little Belt Mountains to accurately determine the population characteristics and habitat used by boreal owls.

OBJECTIVES

The 1991 surveys for boreal owls were initiated to document the occurrence of, and habitat used by boreal owls on the Jefferson Division of the Lewis and Clark National Forest. Similar data were to be gathered for other owl species present. These data will assist in forest planning and will contribute in the assessment of distribution, population dynamics and viability of the boreal owl on the Lewis and Clark National Forest.

INTRODUCTION

The boreal owl (Aegolius funereus) is a highly nocturnal owl which inhabits northern hemisphere coniferous forests around the world. They are generally 21.5 to 30.5 cm long (Farrand 1983) and weigh 100-140 gm (Earhart and Johnson 1970). Boreal owls are small, brown owls with many white spots on their crown, nape, and back. Yellow eyes and a yellowish bill are framed by distinctive black facial frames which are spotted with many small white spots. Their white underparts are streaked with chocolate brown. Juveniles are dark chocolate brown with white spots across the back and white eyebrows and cheek spots.

Boreal owls are secondary cavity nesters, usually occupying cavities constructed by the northern flicker (Colaptes auratus) or pileated woodpecker (Dryocopus pileatus). Boreal owls will also use artificial nesting boxes (D. Genter per. comm.). Boreal owls are territorial and a nesting pair will actively defend the area around the nest site (D. Genter per. comm.). After the courtship in March and April, 4 to 6 pure white eggs are laid. The eggs are incubated for 27-28 days by the female and the young fledge 28-33 days after hatching (Terres 1980). Boreal owls prey mainly on small mammals, primarily redback voles (Clethrionomys gapperi) but also pocket gophers (Thomomys talpoides), shrews (Sorex spp.), and deer mice (Peromyscus maniculatus). Some insects and birds are also eaten (Hayward et al. 1987).

The owls are generally secretive throughout the year, residing

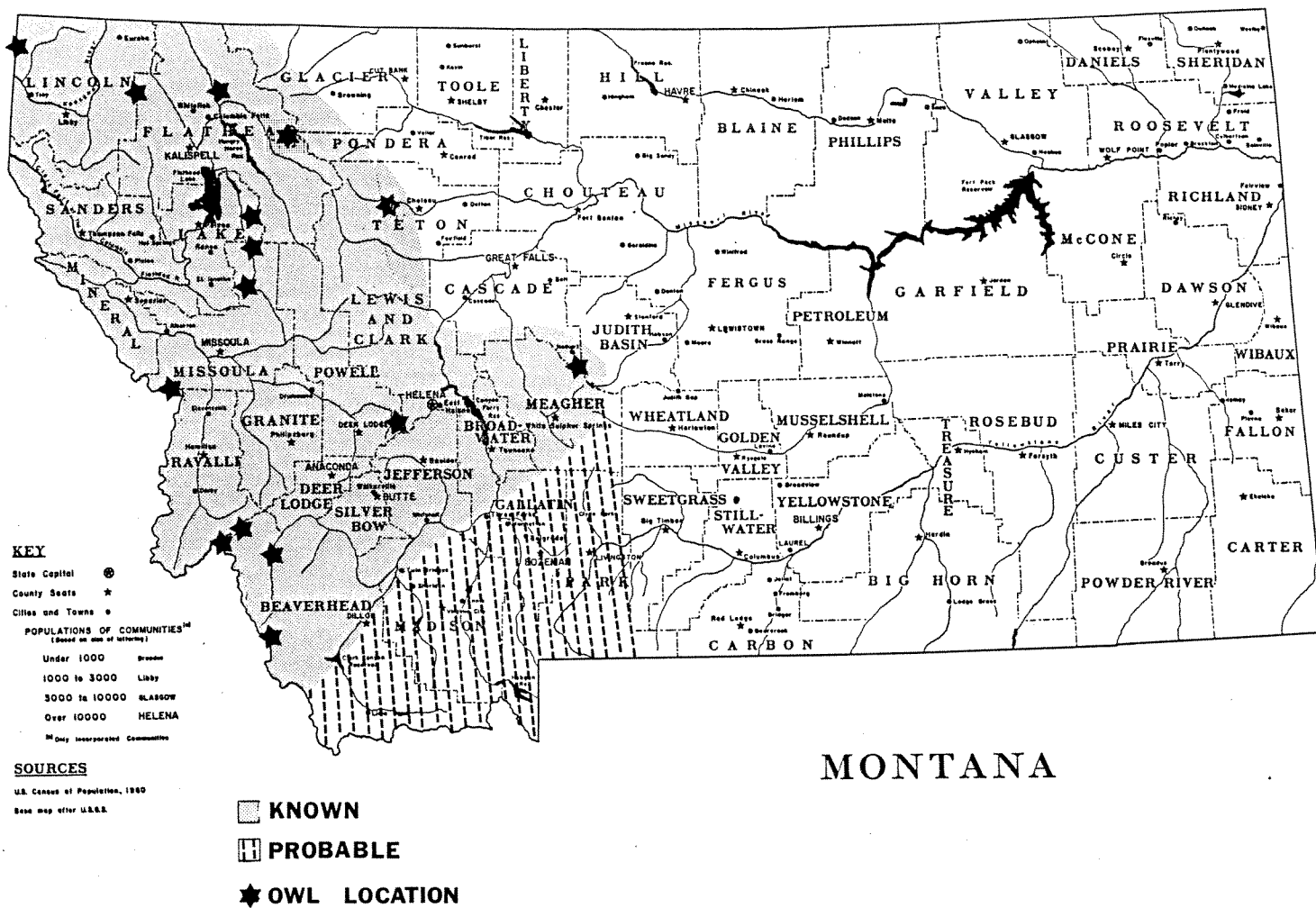


Figure 1. Distribution of the boreal owl in Montana.

in mature spruce/fir forests of North America, but are easily located during the courtship period by conducting nocturnal surveys using the call playback technique (Palmer 1987).

Once thought to exist only as isolated Pleistocene relict populations at high elevations in the Rocky Mountains (Baldwin and Koplin 1966), breeding populations were found in the 1980's in Idaho (Hayward 1983), Colorado (Palmer 1987), and Montana (Holt and Ermatinger 1989). Recent surveys have revealed boreal owls throughout the Rocky Mountains (Hayward et al. 1987, O'Connell 1987). Boreal owls have been located throughout most of western Montana and may be quite common in certain habitats (Holt and Ermatinger 1989, Mullen 1990) (Fig. 1). The lack of knowledge of boreal owl distribution was probably because of the inaccessability of high elevations during March and April, when boreal owls are most easily detected.

Region 1 of the U.S. Forest Service lists the boreal owl as a sensitive species and therefore is required by the National Forest Management Act to monitor it's status and provide habitat to ensure viable populations on national forest lands throughout their range (U.S. Department of Agriculture, 1986). Boreal owls were not known to occur on the Lewis and Clark National Forest in the Little Belt Mountains, but the presence of suitable habitat suggested they may be present and led to this survey.

SURVEY AREA

Surveys were primarily conducted on the Kings Hill Ranger

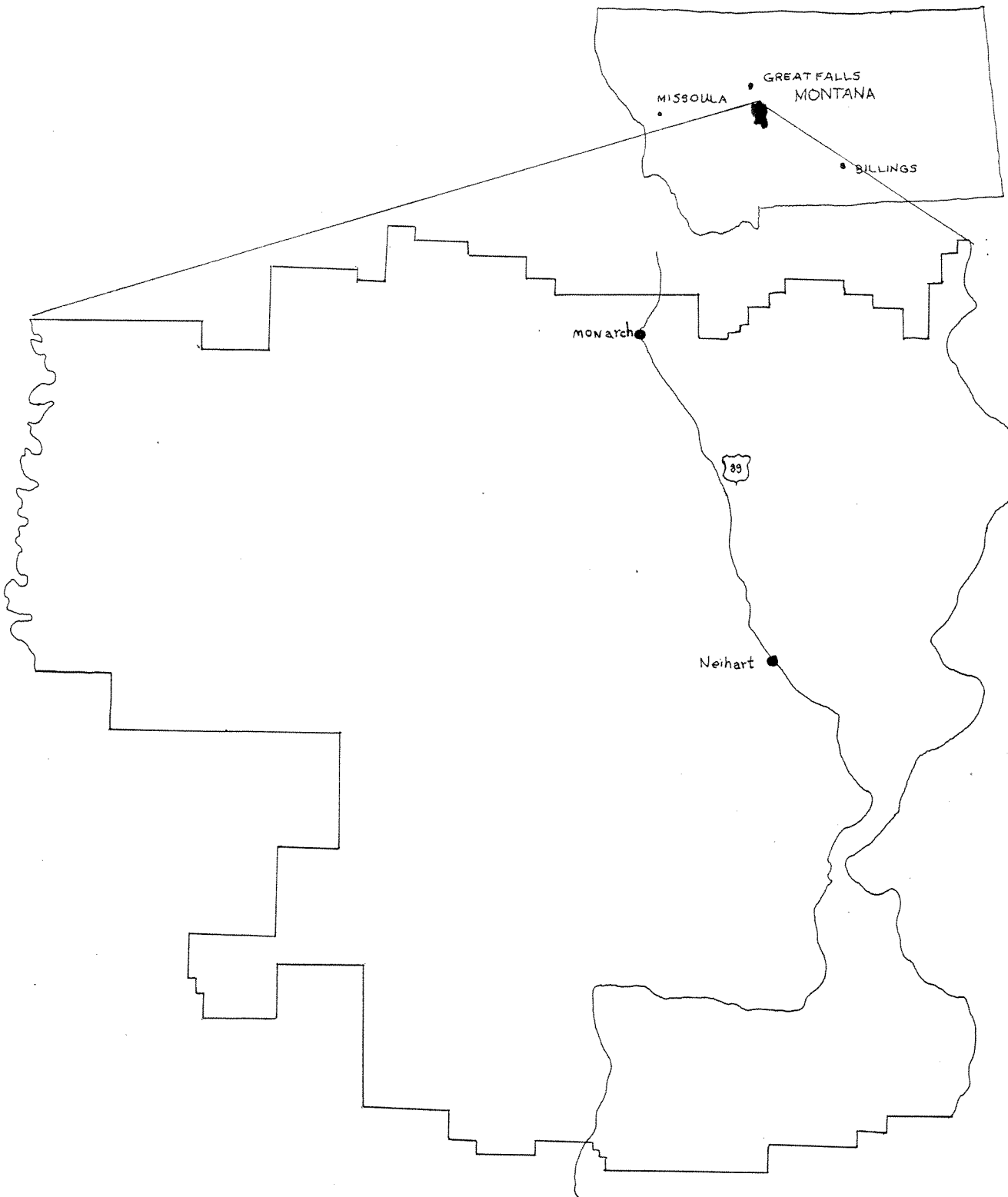


Figure 2. Map of survey area, Kings Hill Ranger District, Lewis and Clark National Forest.

District of the Jefferson Division on the Lewis and Clark National Forest (Fig. 2). The Kings Hill Ranger District lies in the Little Belt Mountains of central Montana. The Little Belt Mountains are dome-like with smooth rounded tops flanked by valleys. They are composed of an igneous rock core with sandstone, limestone, and shale exposed on the higher ridges. The north and south facing slopes are uplifted and tilted limestone beds (U.S. Forest Service 1986). Elevations range from 4500 ft. along the Smith River to 9200 ft. at Slide Rock Point.

Lower elevations of the district are dominated by Douglas fir (Pseudotsuga menziesii) forest with small grassland parks on exposed ridges and steep south facing slopes. Middle elevation areas are dominated by lodgepole pine (Pinus contorta). Aspen (Populus tremuloides), Douglas fir, and spruce (Picea engelmannii) are also found. High elevation areas are severely affected by high winds. Trees tend to be shorter than normal, big boled with dense limbs extending to the ground. Lodgepole pine mixed with stands of whitebark pine (Pinus albicaulis), spruce, Douglas fir, and subalpine fir (Abies lasiocarpa) are the major tree types at high elevations. Alpine meadows are interspersed with trees along the ridges.

Annual precipitation ranges from 14 in. on the lower slopes to 50 in. on the higher peaks.

METHODS

Forest Service technician Bob Gliko and I surveyed owls using

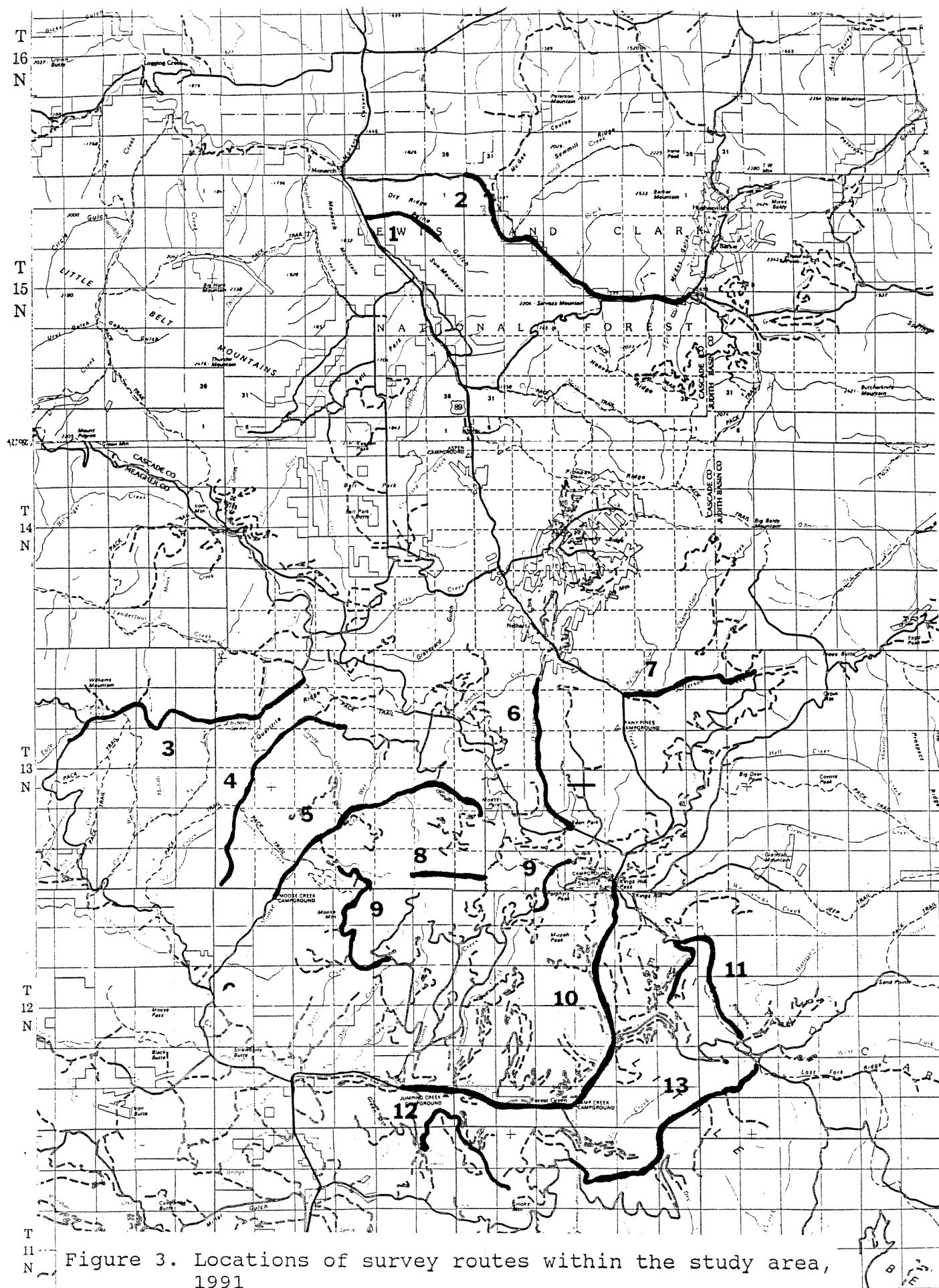


Figure 3. Locations of survey routes within the study area, 1991

the call playback technique (Fuller and Mosher 1981) from vehicles, snowmobiles, and skis along selected survey routes between February 21 and March 27, 1991. Survey routes were primarily at elevations higher than 5000 ft. and in areas with large patches of old growth forests (Figure 3). Routes were selected and prioritized based upon conversations with Forest Service Biologist Don Sasse.

Surveys were started one half hour after sunset and lasted approximately 4 to 5 hrs, weather permitting. Playback stations were one half to 1 mile apart along the survey route. The spacing varied widely on some routes due to the topographic and/or habitat variation. Some survey routes were completed in their entirety on a single night, others were completed in segments surveyed on different nights. Therefore some segments of survey routes overlapped and were surveyed more than once, other portions only once. Time and estimated wind speed and direction were recorded at each calling station. Temperature was recorded at the first and last calling station each night. Elevation of each calling station was determined from topographic maps. At each station we listened for calling owls for 2 to 3 minutes, played 1 species call in all 4 directions for 2 to 3 minutes, listened for 2 to 3 minutes, and then repeated the procedure. Boreal owl calls were played most often, but occasionally great gray (Strix nebulosa) or northern saw-whet (Aegolius acadicus) calls were also used depending on habitat and calling responses. Survey report forms were completed for each survey conducted and owl observation forms were completed for each owl heard (Appendix 1). All calling points and owl

locations were recorded on 7.5 minute U.S.G.S. topographic maps along with the date and time for each calling point and observation (Appendix 2). Calling points were numbered with the route number followed by the calling point number. Owl locations were described according to the timber type of the stand the owl was located in. These types are named for the major volume species in the stand, regardless of tree size, and other species of trees may be present.

RESULTS

Surveys were conducted on 19 nights during the survey period. Weather, especially wind, caused some of the 19 surveys to be cut short and resulted in total survey cancellation on other nights. A total of 15 survey routes were established which totaled 70.2 miles and encompassed 87 calling points. The total number of miles surveyed was 82.6 miles (Table 1). The elevation of calling points ranged from 4720 ft. to 8088 ft. Temperatures during the surveys ranged from 14 to 36 degrees Fahrenheit.

Boreal owls were detected at 8 calling points with a minimum of 6 birds detected. Northern saw-whet owls were the most common owl detected, being heard at 12 stations with a minimum of 14 birds detected. Seven great horned owls (Bubo virginianus) were detected at 5 stations. Two barred owls (Strix varia) were repeatedly located in one area from 3 calling stations and a great gray owl and western screech owl (Otus kennicottii) were located at one calling point each. One unknown owl call was heard at one calling station (Table 2).

#	ROUTE NAME	MILES	N	TOTAL MILES SURVEYED
1	PAINE GULCH	1.2	1	1.2
2	DRY FORK	7	1.5	10.5
3	WILLIAMS PARK	10	1	10
4	ISLAND PARK	6.3	1	6.3
5	MOOSE CREEK	9	1	9
6	O'BRIAN	4.7	1	4.7
7	JEFFERSON	3	1	3
8	MOOSE MT. RIDGE	1.9	2	3.8
9	MOOSE MT./BLACK FOREST	1.3	1	1.3
10	HIGHWAY	9.4	2	18.8
11	DEADMAN	8.1	1	8.1
12	ALLEN GULCH	3.5	2	7
13	HIGGINS PARK	4.8	1	4.8
TOTAL		70.2	16.5	88.5

Table 1. Owl survey routes and lengths, 1991

species	calling point	date	elevation	time	aspect	number	moon
Boreal	5-009	2/24/91	6700	2045	NW	1	FQ
Boreal	8-026	2/26/91	8080	1900	S	1	FM
Boreal	10-034	3/8/91	6400	2225	N	1	LQ
Boreal	8-037	3/11/91	7400	2300	SW	1	LQ
Boreal	13-053	3/13/91	7840	2333	S	1	NM
Boreal	13-054	3/13/91	7840	7	S	1	NM
Boreal	3-065	3/15/91	6680	2237	W	1	NM
Boreal	3-066	3/15/91	6640	2204	W	1	NM
Northern Saw-Whet	10-031	2/21/91	5400	2055	NE	1	FQ
Northern Saw-Whet	10-031	2/21/91	5400	2135	NE	1	FQ
Northern Saw-Whet	10-034	3/2/91	5960	1900	N,S	3	FM
Northern Saw-Whet	2-072	3/4/91	5960	1914	N	2	FM
Northern Saw-Whet	2-070	3/8/91	6320	2225	N	1	LQ
Northern Saw-Whet	2-069	3/8/91	6160	2129	NW	1	LQ
Northern Saw-Whet	2-068	3/8/91	6920	2049	W	1	LQ
Northern Saw-Whet	2-075	3/19/91	5600	2133	S	1	NM
Northern Saw-Whet	2-076	3/19/91	5240	2207	S	1	NM
Northern Saw-Whet	1-002	3/19/91	5240	2240	SW	1	FQ
Northern Saw-Whet	1-003	3/19/91	5160	2252	SW	1	NM
Northern Saw-Whet	12-060	3/20/91	5000	2130	NE	1	FQ
Northern Saw-Whet	12-061	3/20/91	4840	2145	NE	1	FQ
Great Horned	1-001	2/21/91	5100	2025	S	2	FQ
Great Horned	2-075	3/14/91	6200	45	S	1	NM
Great Horned	3-067	3/14/91	6200	2303	SE	1	NM
Great Horned	12-056	3/15/91	6500	2131	NW	1	NM
Great Horned	12-052	3/20/91	4960	2130	-	2	FQ
Barred	10-031	3/2/91	6500	1900	N	1	FM
Barred	10-031	3/2/91	5920	1900	-	1	FM
Barred	10-031	3/4/91	6100	1918	NW	1	FM
Barred	7-060	3/8/91	6500	2129	NE	1	LQ
Barred	7-060	3/8/91	6200	2129	W	1	LQ
Great Gray	12-069	3/19/91	5300	2240	N	1	FQ
Great Gray	12-069	3/20/91	5300	2040	N	1	FQ
Western Screech	3-073	3/19/91	5480	2100	-	1	NM
Unknown	10-032	3/2/91	6080	2035	-	1	FM

Table 2. Owl observations, 1991.

Boreal Owl Detections

Boreal owls were located at elevations from 6,400 ft. to 8,080 ft. Aspects of owl locations ranged were 3 on south facing slopes, 2 on west facing slopes, and one each facing northwest, north and northeast. All were located in response to song playback. All boreal owls located were in lodgepole pine stands except for one in a whitebark pine stand.

Calling point 7-009, 2/24/91, 8:45 pm, Moose Creek Route.

This was the first owl we detected. The owl responded to song playback after the second calling sequence and continued to call until we left the area. It was located on Moose Creek near the confluence of Moose Creek and Rocking Chair Creek (T13N,R7E,sect.24,SW1/4,NE1/4) at 6700 feet. The owl's location was estimated to be in stand 711-06-85 which is classified as lodgepole, well stocked.

Calling point 7-026, 2/26/91, 11:00 pm, Moose Mountain Ridge Route. This owl was heard while skiing to the next calling point after completing a calling sequence. The owl was located at approximately 7840 feet (T12N,R7E,Sect.2,NE1/4,NE1/4), then moved up to the ridge (T13N,R7E,Sect.36,SW1/4,SW1/4) at 8,080 feet and called again. It continued calling until we tried song playback again five minutes later. The owl was initially located

in stand 709-02-20 which is classified as mixed conifer, well stocked, and flew in response to song playback to stand 709-02-02, lodgepole, poorly stocked.

Calling point 7-034, 3/8/91, 10:25 pm, Highway Route. This owl was heard after the second playback sequence. The owl responded only twice so the location is not precise. We estimated that the owl was located at the bottom of Deadman Creek (T12N,R8E,Sect.23,NE1/4,SW1/4) at 6400 feet. The owl ceased calling when a northern saw-whet owl started calling near the calling point. The boreal owl was estimated to be in stand 702-02-42 which is lodgepole, medium stocked.

Calling point 7-037, 3/11/91, 11:00 pm, Highway Route. We located this owl near the highway at the top of Kings Hill Pass near the Forest Service rental cabins (T13n,R8E,Sect.34,E1/2,SW1/4). The owl responded to the initial song playback and was located immediately south of the calling point within 200 ft. The owl called a number of times and appeared to move around the edge of the hill while we were listening. This owl was located in stand 702-04-29 which is lodgepole, well stocked.

Calling points 7-053 and 7-054, 3/13/91, 11:33 pm to 12:07 am,

Higgins Park Route. We heard this owl in response to initial playback at both calling stations. It remained in the same location (T12N,R8E,Sect.36,NW1/4,SE1/4), and called vigorously. This was the only boreal owl located in a whitebark pine stand, stand number 701-02-04, and was the only boreal owl that did not move in response to song playback. This was also the only location where we heard a boreal owl and great horned owls in close proximity.

Calling points 7-065 and 7-066, 3/15/91, 10:04 pm to 10:37 pm, Williams Park Route. This location provided the only visual observation of a boreal owl during the survey. The owl was initially heard giving an OOO-WEE call at calling point 7-066 (T13N,R6E,Sect.20,NE1/4,NE1/4). The owl then followed the surveyors to the next calling point 7-065 (T13N,R6E,Sect.16,SW1/4,NW1/4), where it was observed calling in a tree adjacent to the road. There the owl was heard giving the typical winnowing call. The owl was initially located in stand 713-05-009, which is classified as lodgepole, well stocked and moved to stand 713-05-29, which is also classified as lodgepole, well stocked.

DISCUSSION

Intensive studies by Hayward et al. (1987) and Bondrup - Nielson (1984), show only potentially breeding males call, implying that the presence of calling owls indicates a breeding population. Therefore, the presence of calling boreal owls in the study area indicates that boreal owls nest in the Little Belt Mountains. The results of this survey should only be considered an indication of boreal owl activity and locations since the data gathered cannot be used to provide estimates of population levels or density within the study area.

Factors affecting the responses of boreal owls to call playback survey techniques are numerous. The single most important variable negatively affecting response is wind (Smith 1987 and Palmer 1987). We experienced numerous evenings that the wind canceled or shortened surveys and therefor we did not cover some areas that we feel have potential for boreal owl observations. The only previous surveys attempted on the district ended without any calling on three nights due to high winds and snow (Escano 1984).

All boreal owl locations in this survey except one were in timber stands classified as lodgepole. The other was in a whitebark pine stand. These findings are different than those found in the Bitterroot Divide (Holt and Hillis 1987), central Idaho (Hayward et. al. 1984), and southwest Montana (Mullen 1990) which all found boreal owls in spruce/fir forest types, although Escano (1984) reported that surveys on the Beaverhead National Forest located 4

boreal owls in lodgepole pine habitat types with scattered meadows or grass/sage openings. This discrepancy with the prevalent habitat type reported may be due to the limited amount of spruce/fir stands available at higher elevations in the Little Belt Mountains, or may be a factor of the habitat classification methods used in this survey.

Boreal owls in the Little Belts may have problems with warm summer temperatures since boreal owls are easily heat stressed (Hayward et al. 1987). Therefore, dense stands of timber which would provide cool moist sites for roosting may be important to boreal owls in the Little Belts. Also the high level of wood cutting on the district (Sasse pers. comm.) may limit the availability of suitable nesting snags for boreal owls. Hayward (pers. comm. in Mullen 1990) suggested that clearcuts may provide edge habitat used by owls for hunting. However, Mullen (1990) warned that man-made openings also are often accompanied by the potential for increased human disturbance and the invasion of competing owl species, especially great horned owls.

Boreal owls have extremely variable calling activity (Hayward et al. 1986, Palmer 1987). Variations in prey populations directly influence calling activity by reducing breeding activity during periods of low prey populations (Hayward 1987). Bondrup and Nielsen (1978) found that pair formation will also cause the male to stop calling. Hayward (1983) noted that one male did not respond to surveys during the normal courtship period because he was already paired. Palmer (1987) found courtship periods ranging from 4 to 59

days with the longest courtship periods found for unpaired males. The variability in boreal owl calling activity shows that we can not effectively determine population dynamics of the boreal owl in the Little Belts from 1 survey season.

CONCLUSIONS AND RECOMMENDATIONS

This survey confirms that boreal owls are present in the Little Belt Mountains and expands the known range of the boreal owl into the isolated mountain ranges of central Montana. Hayward (1987) noted that the potential vulnerability of local populations to extinction depends upon the degree of interchange among demes. Determining and providing for the required degree of interchange may be especially important to populations in isolated mountain ranges such as the Little Belts. Boreal owls may also be present in the other isolated mountain ranges of central Montana such as the Crazy, Castle, Snowy and Judith Mountains. Surveys in the proper habitats in these mountain ranges would be beneficial to determine the eastern extent of boreal owls in Montana and the geographical relationship of boreal owl populations to one another.

Further investigations into the exact vegetative composition of the stands owls were located in would be beneficial. Since boreal owls generally use only conifer snags over 21" diameter at breast height in forested stands as nesting cavities (Hayward 1990), an upper size limit for conifers cut for firewood in high elevation areas may be considered. Small mammal surveys should also be conducted to determine the small mammal species occupying the

Little Belts that may be prey items for boreal owls.

As Mullen (1990) pointed out, short term surveys such as this do not take into account the yearly variation in boreal owl calling rates and any management directed solely by this one year of study may be harmful. Additional survey years may yield owl observations in areas that did not result in boreal observations this year. At least 4 years of surveys should be conducted to effectively determine boreal owl distribution in the area (Mullen 1989). Repeat surveys and additional surveys should be conducted, extending through April to better cover the study area. Emphasis should be placed on locating nest sites to gain a better idea of breeding habitat in the Little Belts.

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APPENDIX 1

SURVEY REPORT FORM

Party Members

Date _____

Target Species
(if any)

Route Name

County _____

Route location:

Drainage

Elevation _____

Forest _____

District _____

Repeat Visit ? Y N

Route Description

Distance:

Means of travel:

(auto, ski, etc.)

Start time:

Finish time:

Weather (at end of survey)

Temperature:

Cloud cover:

Snow depth:

Precipitation (describe):

Wind:

Species encountered (if any, use Owl Observation Form)

species #

OWL OBSERVATION FORM

Party Members _____ Date _____ Route Name _____

Repeat Observation ? Y N

Species _____ Number present _____ Time _____

to _____

Location:

TRS: _____ Slope _____ Aspect _____ Elev _____

County: _____ Forest: _____

Drainage: _____ District: _____

Describe Observations:

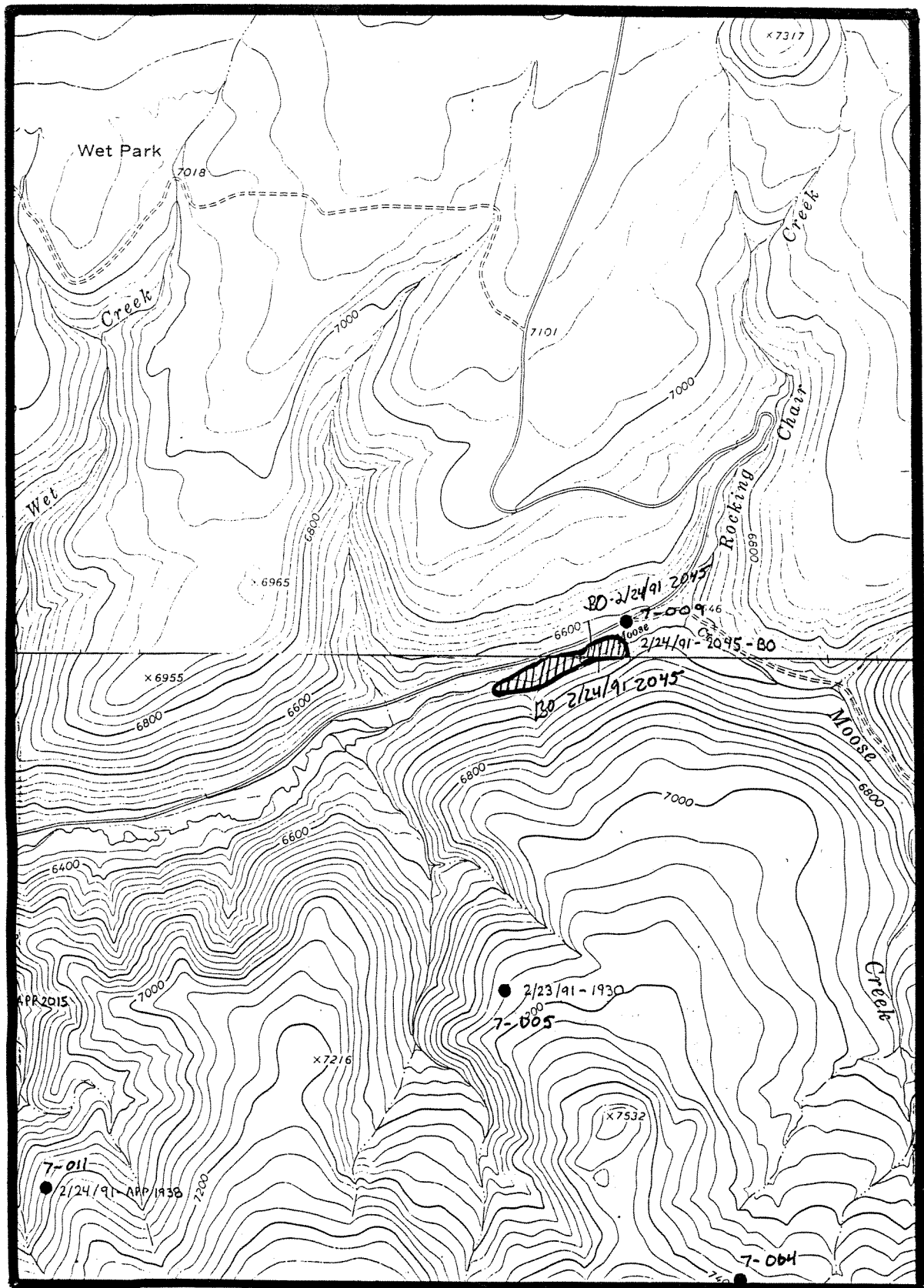
Describe Location:

Describe Habitat:

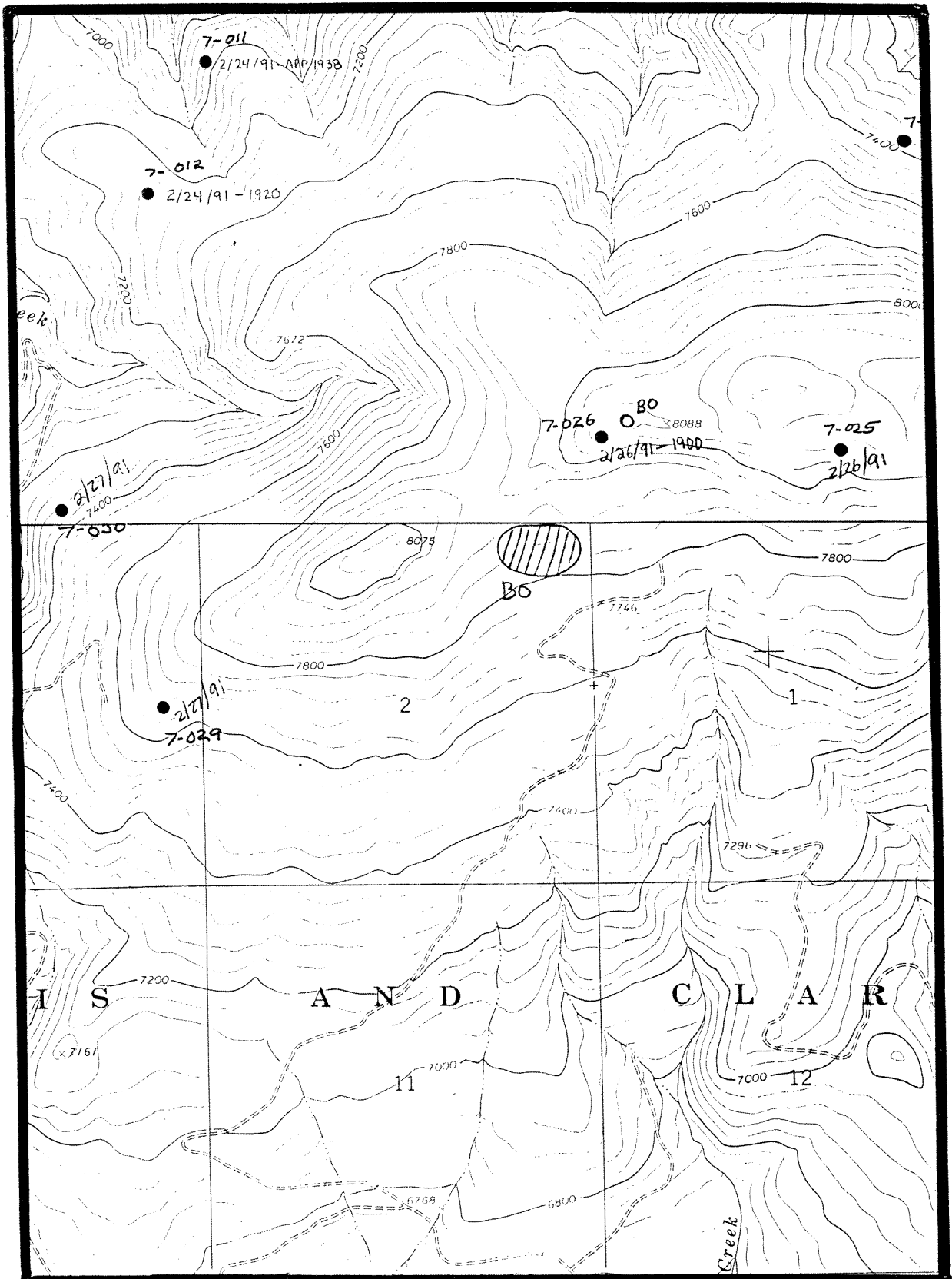
Describe Land use/management:

Comments:

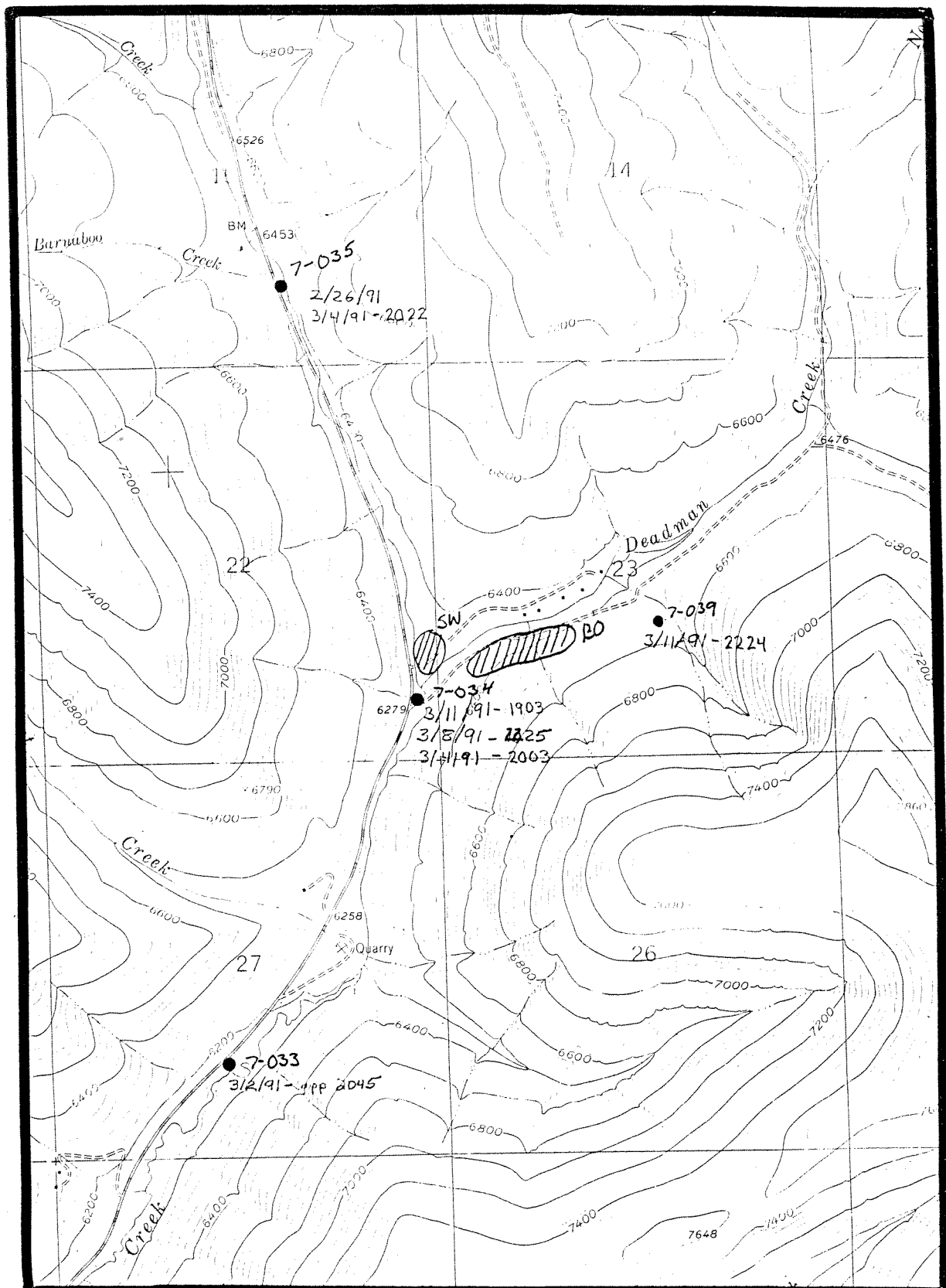
APPENDIX 2



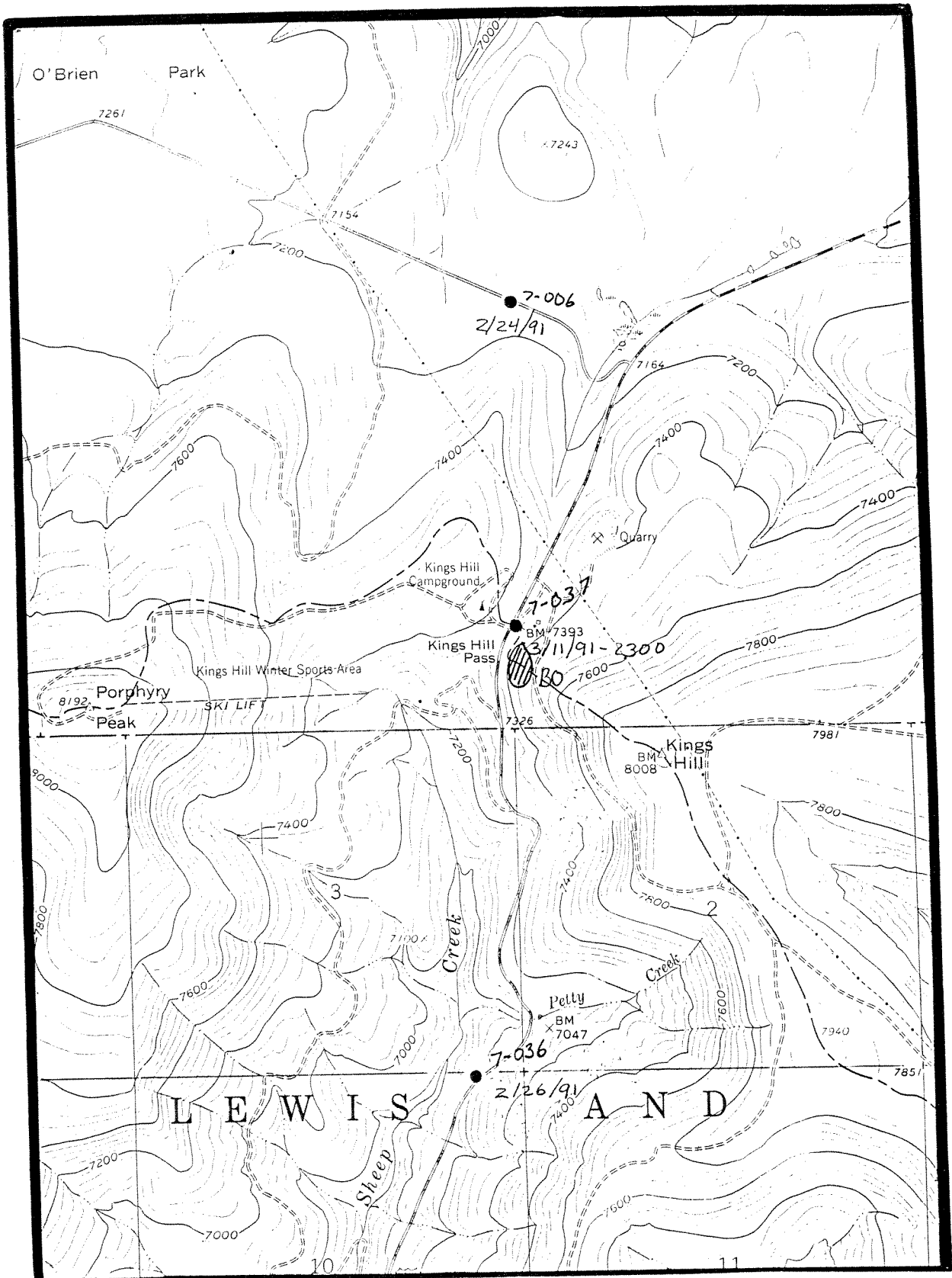
Calling point 7-009



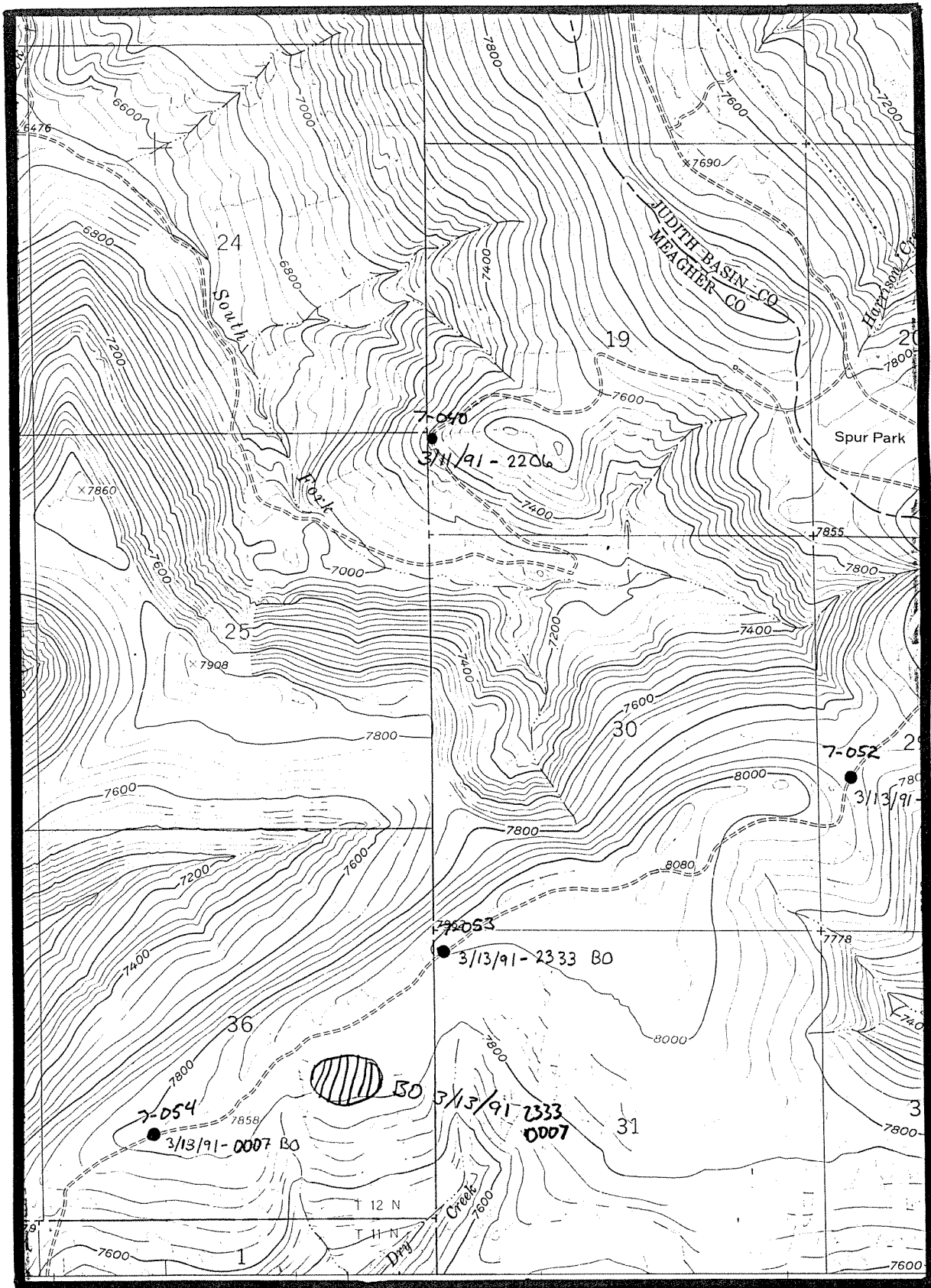
Calling point 7-026



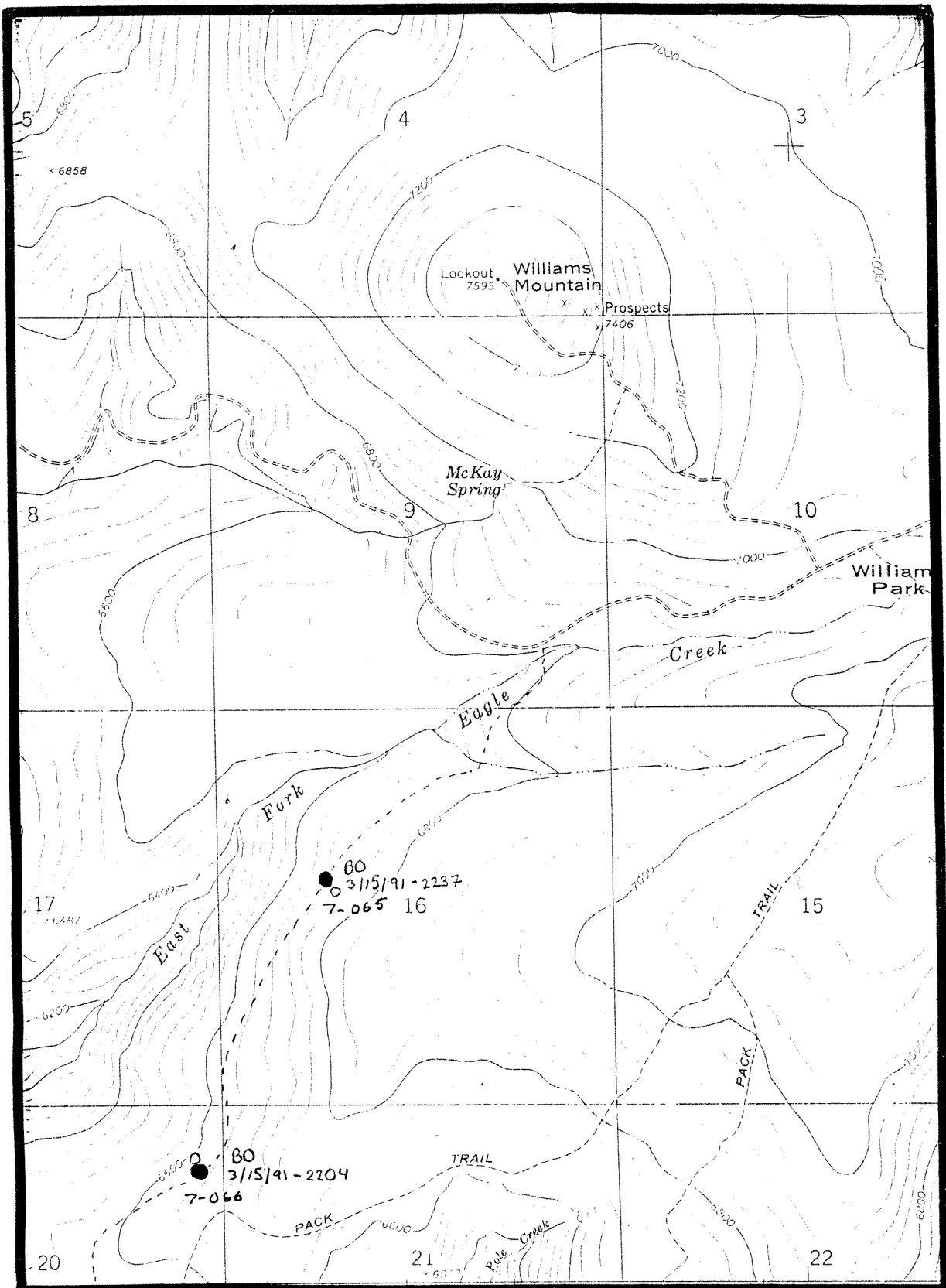
Calling point 7-034



Calling point 7-037



Calling points 7-053 and 7-054



Calling points 7-065 and 7-066